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EAP 12/09/88 #10

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Robert S. Beyersdorf et al.

Serial No.: 205,037 Group Art Unit: 153

Filed: June 10, 1988 Examiner: N. Nutter

For: LATEX COMPOSITIONS USEFUL AS BINDERS IN COMPOSITE BOARD HAVING DIMENSIONAL STABILITY AND STRENGTH

AFFIDAVIT II UNDER 37 CFR §1.132

STATE OF MICHIGAN)
) ss.
County of Midland)

John D. Camisa, being duly sworn, disposes and says that:

He is a citizen of the United States of America residing in the City of Midland, County of Midland, State of Michigan;

He is by profession a research scientist, having been graduated from St. John's University with a degree of Bachelor of Science, and a major in chemistry;

He has been employed since 1968, by The Dow Chemical Company, Midland, Michigan, in Technical Service and Development and has carried out considerable research and development in the field of latex containing composites and has studied their chemical and physical properties.

He has either prepared the following Ceiling Tiles A, B, and C or the ceiling tiles were prepared under his direction.

Ceiling Tile A was prepared with Latex A received from William Keskey and designated as Latex A in Affidavit I filed herewith, Ceiling Tile B was prepared with Latex B received from William Keskey and designated as Latex B in Affidavit I filed herewith, and Ceiling Tile C was prepared with Wheat Starch.

Ceiling Tile A was prepared with 15.0 grams polymer solids of Latex A containing 90 parts styrene, 9 parts ethyl acrylate, and 1 part fumaric acid.

Ceiling Tile B was prepared with 15.0 grams polymer solids of Latex B containing 25 parts of butadiene, 65 parts of styrene, 9.5 parts of acrylic acid, and 0.5 parts of a β-carboxyethyl acrylate.

Ceiling Tile C was prepared with 15.0 grams of starch and no latex.

Each ceiling tile was prepared similarly by the following method.

Printed newsprint (cellulose) was dispersed in water at 2.0 percent solids. A Cowles blade was used with an air stirrer at high rpm to redisperse the cellulose to a Canadian Standard Freeness of 250-300 mls. Water (4,000 ml), clay (6.0 grams), perlite (37.5 grams), mineral wool (75.0 grams), and the dispersed cellulose (825 ml., 16.5 grams of fiber) were mixed for three minutes with moderate agitation using a Cowles blade. Latex (15.0 grams of polymer solids) was added and the slurry was mixed for 30 seconds. 500 Milliliters of flocculent, 0.1 percent cationic polyacrylamide, was added. The latexes were considered flocculated when the water was clear. Flocculation was carried out with less than moderate agitation. The flocculated furnish was poured into a Noble and Wood

mold apparatus and was diluted to approximately 2.0 percent solids. The furnish was dispersed and drained on a retaining wire and the mat was pressed to a thickness of 630 mils and dried at 375°F to 400°F in a forced air oven. Ceiling Tile C was prepared similarly to the Ceiling Tiles A and B but was wrapped in aluminum foil and heated in an oven at 300°F for 45 minutes to cook the starch, then was dried under the same conditions as the other tiles. Several sample piece boards were cut from the principal tile. The resulting boards were approximately 8.2 by 8.2 inches, with a thickness of approximately 0.7 inches and a density of about 12 lbs/ft^3.

The Data Accumulated for the Ceiling Tiles

A. The Modulus of Rupture

The Modulus of Rupture was determined by suspending samples 1-1/2 square inches wide, cut from the main board, over a three inch gap and applying a force in the center of the gap using a 4501 Model Instron. The resulting peak force at break was used in the equation below to calculate the MOR.

The Modulus of Rupture is calculated from the standard 3 point breaking loading test described in ASTM 367-78 as follows:

$$\text{Modulus of Rupture (MOR)} = 3\ PL/bd^2$$

where:

P = peak force required to break the sample (lb)
L = span between the sample supports (in)
b = width of the sample (in)
d = thickness of the sample.

This Modulus of Rupture is corrected for density variation as shown:

MOR corrected = (MOR) D^2

where D is the density correction
D = desired density/actual density

B. The Sag Resistance

Sag resistance is determined by exposing about a 1-1/2 x 6-inch sample strip of composite board of the composition as described above to 97°F, 95 percent relative humidity for 96 hours, placing 330 grams of weight in the center and then measuring the displacement of the center of the board in thousandths of an inch (.001 in.).

The Sag was determined by using a micrometer positioned on a bracket which allowed the sample strip to be measured prior to and after sagging. The final reading in thousandths of an inch was subtracted from the initial reading to determine the total movement of the sample strip. The units were then converted to millimeters.

Two sample strips per board were tested per tile and the results for the ceiling tiles are as follows:

	SAG (millimeters)	Corrected MOR (psi)
Ceiling Tile A		
Sample 1	0.39	186.5
Sample 2	0.41	
Ceiling Tile B		
Sample 1	1.09	181.9
Sample 2	0.812	
Ceiling Tile C		
Sample 1	3.46	212.4
Sample 2	3.41	

Further Affiant says not.

John D. Camisa

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Sworn to and subscribed before me this 2nd *day of* December, *1988*

Jackie L. Raymond

Notary Public

JACKIE L. RAYMOND
Notary Public, Midland County, Michigen
My Commission Expires September 23, 1991

LMS/SSG/sg